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QUALITY STANDARDS IN POLYCENTRIC SYSTEMS: A CASE OF SHIPPING

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Abstract

This article contributes to the literature on transnational environmental governance (TEG). Polycentricity is a popular conceptual approach in TEG, but coordination in polycentric systems remains largely unexplored. We put forward a conceptual model of quality standards as a productive links between different orders of governance in polycentric systems. Existing theories distinguish between regulative, institutional, and normalizing functioning of quality standards. We develop an integrative approach highlighting the mechanisms of coordination that rely on these three functions of quality standards. The case of TEG in shipping is used to illustrate how quality standards function not only as soft rules, but also as institutionalized references and shared conventions, enabling coordination across levels and scales. The paper draws attention to the limits of regulatory standardization, outlining how practical value can be gained from emphasizing the normative work associated with promulgation of quality standards.

Keywords: transnational environmental governance, quality standards, polycentricity, coordination, shipping.

1. Introduction

Shipping, a critical infrastructure of global economy that carries 80% of international trade volume and more than 70% of its value (UNCTAD, 2017), is an inherently transboundary activity with low governability, particularly when it comes to environmental and safety performance (Hinds, 2003; Roe, 2012). It has been argued that since transboundary environmental policy problems are usually linked simultaneously to multiple contexts, the institutions developed within one state or one level of government cannot adequately address them (Christopoulos et al., 2012; Varone et al., 2013). Shipping illustrates this argument admirably. A closer consideration of shipping governance draws attention to the fact that there is no single actor, institution, or source of authority that defines and steers environmental quality in shipping. Instead, there is a plurality of actors and rules forming a set of governance arrangements within multiple interdependent contexts under the overarching set of maritime laws, conventions, and customs, which satisfies the criteria of a polycentric governance system (Roe, 2012; Bloor et al., 2014; van Leeuwen, 2015; Gritsenko, 2017). How can such a systemdeliver coherent outcomes, in other words, how it is coordinated across levels, in the sense of jurisdictions, and scales, defined here as spatio-temporal relations among levels (Sayre, 2009), remains poorly understood.

Polycentric governance refers to a type of societal organization based upon spontaneous order related to a common set of overarching end goals (Aligica and Tarko, 2012, p. 251). Scholars have noticed that in comparison to hierarchical (multi-level) or participatory ('flat') governance arrangements, polycentricity enables improved equivalence of problems and solutions as rules are scaled to impact; improved resilience, as functions of a unit can be taken over by an overlapping unit in case of failure; and improved flexibility, as the existence of multiple units enables mutual learning and provides room for experimentation (Huitema et al., 2009; Ostrom, 2010a, 2010b; Cole, 2011; Newig and Koontz, 2014). While polycentric governance has been successfully used as both a positive and normative concept (Thiel, 2017), scholarly understanding of the operational characteristics of polycentric systems, their structural components and principles of functioning, is mainly focusing on empirical studies of resource regimes (Andersson and Ostrom, 2008; Gruby and Basurto, 2014; Pahl-Wostl and Kneiper, 2014; Baldwin et al., 2016). Climate governance, commonly conceptualized as a case of polycentric governance, has been similarly grounded in common pool resource (CPR) theorizing (Schlager and Heikkila, 2011; Abbott, 2012; Ostrom, 2012).

Scholars have noticed that the absence of a single source of authority or central planning system increases the transaction costs and makes polycentric systems prone to coordination failures (Imperial, 1999; Sørensen and Torfing, 2005; McGinnis, 2005). At the same time, it has been argued that polycentric systems can generate rules for mutual coordination through the ongoing process of learning and mutual adjustment (Ostrom 2010a; Galaz et al. 2012; Koontz et al. 2015). Hence, the outcomes in every case are a subject to empirical scrutiny (Ostrom et al., 1961). Examples of successful rule-generation processes have been mainly provided in natural resource governance (Pahl-Wostl and Kneiper, 2014; Baldwin et al., 2016), which is both geographically situated (resource location) and subtractable (rivalry in consumption). Rarely the coordination process has been discussed in deterritorialized systems, exceptions are the works on banking (Polski, 2012; Salter and Tarko, 2017) and science (Polanyi, 1952; Tarko, 2014). In this article, we build on the previous evidence to develop an account of how complex multi-level and multi-actor systems tackle multiple and interdependent collective action problems beyond natural resource management. In particular, we pay attention to the mechanisms that align all levels of decision-making, from routine operations to 'rules about rules' (or meta-governance) in transnational environmental governance of shipping.

This paper argues that quality standards, defined here as *de jure* requirements and *de facto* expectations applied to products and processes, facilitate coordination between geographically and organizationally diverse economic actors in maritime shipping, a domain characterized by multiple intra-sectoral linkages. For the purpose of this paper, we define coordination as a process of

organization of different actors and activities enabling them to manage interdependencies (Malone and Crowston, 1990). Combining the perspectives on standards from transnational business governance (TBG) and global value chains (GVC) literature, we re-think the extant analysis of TEG in shipping that focuses on organizationally-driven "orchestration" to address fragmentation of authority (Lister et al., 2015). We offer a standards-driven account of coordination.

We use existing empirical studies of shipping governance to illustrate how quality standards transcend the "orders of governance" (Kooiman and Jentoft, 2009) and coordinate the choices different actors make across maritime value chains. When it comes to the first level - operations – quality standards convey complex information and institutionalize risks, at the second – policy - level, they shape access to global value chains and align expectations of public and private actors, and at the level of meta-governance they promote images of governance and link the current state of affairs to the array of potential futures. The analytical model is elaborated based on an extensive review of academic literature in the field of maritime studies. Understanding the dynamics of quality standards in this polycentric system is an important step in improving the maritime governance system as a whole and achieving more sustainable shipping in the future.

The paper proceeds as follows. Section 2 reviews the literature on the functioning of quality standards and demonstrates that the relationship between different functions remained undertheorized. Section 3 introduces the coordination problem in polycentric governance and, combining it with the literature introduced in Section 2, offers a model of quality standards as a means of coordination. Section 4 draws on existing maritime research to apply the conceptual model developed in Section 3 to the case of shipping, and demonstrates why quality standards are essential to polycentric shipping governance. Finally, Section 5 discusses the theoretical and practical implications of the conceptual model and concludes.

2. Quality standards in transnational environmental governance

From electric plugs to shoe sizes, standards are ubiquitous in our societies. They are a special type of rules that are not tied to hierarchical authority, seeking to convince rather than to coerce the addressees (Kerwer, 2005). Specific interest of this paper is in quality[1] standards, defined as *de jure* (formalized) requirements and *de facto* (implicit) expectations pertaining to the properties and characteristics of products and processes that make them 'knowable', allowing actors to evaluate how

[1]The word "quality" has a variety of colloquial uses; in the definition of the International Standard Organization it is "the totality of characteristics of an entity that bear on its ability to satisfy stated and implied needs"(ISO 8402), that is adopted for the purpose of this paper.

these products and processes are positioned in the market (Ponte and Gibbon, 2005). We adopt a broad view on standards to emphasize the variety of jurisdictions in standard-setting and use, a crucial characteristic of contemporary governance.

The phenomenon of standards and standardization has been explored in various branches of social science, including organization and business studies (Gilbert et al. 2011; Brunsson et al., 2012; Botzem and Dobusch, 2012; Reinicke et al., 2012), international political economy (Ponte et al. 2011; Marx et al., 2012; Henson and Humprey, 2012), political science (Schepel, 2005; Kerwer, 2005; Demortain, 2008; Abbott et al., 2015) and law (Hatto, 2001). In this literature, standards have been categorized along various dimensions, such as content, scope, target audience, geographical applicability, emergence and implementation (Table 1). One important theoretical insight of these typologies is the role of non-state actors, their desire and ability to engage with state-led coordination using standards. Thanks to their position aside from command-and-control regulation, standards are flexible enough to accommodate a plurality of visions within a governance system, while clarifying the intended relationship between different elements of the value chain (such as, environment, safety and production practices).

TABLE 1

In the context of environmental governance, quality of life and natural assets are the main targets for standardization (UNDP, 2002). The functioning of quality standards in transnational environmental governance can broadly be divided into three strands of theorizing: regulative (standards as set up rules), institutional (standards as collective intentions) and normalizing (standards as conventions).

The first strand conceptualizes quality standards as an alternative to legal rules, termed also “soft law”, “best practice”, or “corporate social responsibility” (Kerwer, 2005; Tallontire, 2007). According to the scholars who study transnational business governance (TBG), action guidelines contained in quality standards can reduce informational asymmetry in public-private networks (Prakash and Potoski, 2007; Vogel, 2008) and address the problem of ‘certifying the certifiers’ (Potoski and Prakash, 2005; Auld, 2014). From the global value chains (GVC) perspective, companies often use quality standards strategically to gain competitive advantage (Christmann and Taylor, 2006), and that such development can be found even under authoritarian capitalism (Hofman et al., 2017). Their main drawback is the need for effective enforcement that may be costly or even not feasible in a transboundary context (Guldbrandsen, 2010).

The second strand pays attention to the institutional functions of quality standards, regarding them as collectively generated repositories of regulatory ideas (Bomhoff and Meuwese, 2011). A review of tools and techniques of regulatory governance in TBG provided by Eberlein et al. (2014) draws attention to functioning of meta-regulatory standards for standard-setting, auditing, accreditation, and certification. The scholars who investigated the emergence of international environmental management systems and quality standards, promulgated by the International Standards Association (ISO), discovered that the ISO 14000 after its establishment in 1996 has been effective in creating a common procedural language (Mendel, 2002). In other words, quality standards promote multi-stakeholder dialogue among public, private and civil society actors involved in standard design and maintenance (Vogel, 1997; Abbott and Snidal, 2001; Levi-Faur, 2011). While the range of actors who may influence the norms in value chain governance is wide, the standards allow them to integrate individual regulatory strategies through broader set of quality expectations (Tallontire, 2007). At the same time, powerful industry alliances coming together to maintain quality control for protection of their reputation through establishing *de jure* voluntary, yet, *de facto* mandatory standards (Gereffi and Mayer, 2006), allows the 'lead firms' to organize international production networks in a favorable way (Nadvi, 2008).

The last strand of theorizing focuses on the normalizing function of quality standards. Some GVC scholars integrated convention theory stemming from the French sociological tradition (Boltanski and Thevenot, 2006) into the study of quality standards (Ponte and Gibbon, 2005) to emphasize that alongside with rules rooted in collective intentions, mutual expectations that arise in the process of actions, called conventions, not only guide, but also legitimize actions. The normalizing function of quality standards allows bridging immediate (and often tacit) and broader codified knowledge by providing vocabularies for describing expectations and visions of desirable outcomes (Ponte et al., 2011). These visions and associated vocabularies defining what quality is, which procedures for quality governance are appropriate, and who can exercise control over it, are rooted in the broader historical context and societal values (Busch, 2000; Barham, 2002).

While TEG scholars engaged with standards for almost two decades, the relationship between the three functions of quality standards remains undertheorized. We argue that the missing link in terms of conceptualizing and analyzing quality standards in TEG is to acknowledge that quality standards have a regulative, an institutional, and a normalizing function simultaneously – yet, at different orders of governance, which enables coordination between multiple actors. In what follows, we combine the insights on quality standards presented above with a polycentric governance framework to better understand how standards enable coordination across levels and scales. In particular, we discuss how

the regulative, institutional and normalizing functions of quality standards help actors to manage interdependencies in polycentric shipping governance.

3. Polycentric governance and quality standards

3.1 Coordination in polycentric governance systems

The concept of polycentricity that marks the (co-)existence of many decision-making centers within a common overarching framework, first appeared in social science scholarship in the mid-20th century (Polanyi, 1951; Ostrom et al., 1961). Table 2 summarizes the basic features of polycentricity in the Polanyi-Ostrom tradition. The examples of a polycentric orders include competitive public economies, scientific inquiry, law and adjudicatory arrangements, systems of federal governance, and international affairs (Polanyi, 1951; Ostrom et al., 1961; Ostrom, 1991; King, 2006). The presence of *de facto* (in addition to *de jure*) aspects of basic self-organization allows ascribing these cases as instances of polycentricity rather than anarchy. The theoretical argument in all these examples suggests the existence of autonomous decision-makers pursuing their goals independently of each other within a common overarching framework in which conflict resolution does not depend on any central mechanism or a reference to an external authority, but rather on a system of internal references. Unpacking an overarching framework of internal references is arguably a key to understanding the coordination mechanisms that are at work in polycentric systems.

TABLE 2

Following the extant literature, we make a distinction between geographically situated natural resource systems that govern common pool resources (CPR) characterized by subtractability and systems where collective action revolves around non-place based non-subtractible goods. This distinction is important because territoriality and substractability are associated with a variety of regulatory techniques not applicable for solving global environmental problems, as demonstrated in the literature on global public goods (for example, Kaul et al., 1999).

In polycentric CPR governance, coordination between local user groups and between local, regional and national jurisdictions has been shown to be provided by establishing a system of "complementary backup institutions" along with local users' associations (Baldwin et al., 2015). One feature of CPR systems – their territoriality – makes networking viable through tangible joint projects based on an interplay between individuals, international organizations and their collaboration patterns (Galaz et

al., 2012). The outcomes of coordination mechanisms described by Baldwin et al. (2015) and Galaz et al. (2012), the former leading to joint projects and rules co-evolution and the latter limited to mutual adjustment in multi-actor settings, are both characterized by emergence of communication networks that safeguard the overarching common framework, sometimes referred to as orchestration (Abbott and Bernstein, 2015). In sum, coordination in polycentric CPR governance is enabled by network forms of organization where distinction between rule-makers and rule-takers is blurred.

In polycentric governance of non-place based goods of non-rival use, little empirical work has been completed to explore the characteristics of coordination. Empirical findings from studies on climate change adaptation demonstrated that polycentric regimes are more effective than fragmented regimes due to the existence of coordination among various centers and across spatial levels (Pahl-Wostl and Kneiper, 2014). No detailed insight into coordination mechanisms was provided by the authors. Tarko (2014), who explicitly focused on polycentric governance in deterritorialized settings, showed how *informal rules and norms* allowed successful coordination within a polycentric scientific community. After Polanyi (1962), Tarko referred to scientific standards as the key coordination mechanism. There exists an alignment between these standards and the incentives of individual actors, he argued, since scientific standards help individual scientists to promote truth-seeking. Although standards may change, their alignment with individual goals ("dynamic orthodoxy") facilitates enforcement of rules against shrinking, and prevents backwash from competition. Hence, we hypothesize that in deterritorialized polycentric governance, conventions pertaining to the desirable properties and characteristics of the governance outcome may play a crucial role for coordination.

3.2 Quality standards as a coordination mechanism in polycentric governance

The previous section showed that while an overarching system of rules is a necessary condition for coordination in polycentric governance, these rules do not always have to be explicit, codified or enforced by a third party. Quality standards fit nicely into this idea of coordination in polycentric order as they in fact form a system of internal references. Table 3 introduces a conceptual model for functioning of quality standards in polycentric governance. We distinguish between three orders of governance (Kooiman and Jentoft, 2009), in their turn, corresponding to the types of choices available to actors (Ostrom, 2005). The orders of governance are not temporal, spatial or scalar (local to global), but refer to the three basic sorts of societal governance activities which are closely related and always simultaneously present. Respectively, the nature of coordination varies between the orders and can be described as either material and regulative, or institutional and integrative, or discursive and normalizing (Pattberg, 2005).

TABLE 3

First order governance is about problem solving and opportunity creation. Actors make operational decisions in day-to-day affairs, with a direct impact on a physical world (McGinnis and Ostrom, 2014). These types of governance activities rely upon standards as rules that define practical choices among the available options pertaining to both products and processes – the regulative function of quality standards. In the case of products, typically standards are a set using technical characteristics that allow for product differentiation. Process standards govern a wider array of product attributes, addressing ethical behavior, risk management, social responsibility or environmental sustainability. Within first-order governance, standards are concrete and material, mainly written, action guidelines and they are a part of the policy implementation routine. Coordination has a regulative character and mainly targets the content of a product or process.

Second order governance is about institutions, their design, care and maintenance and presupposes collective – or policy – choices. Standards here have a function of collective intentions that translate common framings of problems and goals into actions. Industry standards visualize the direction where the industry wants to go and often outline how to materialize this vision in terms of concrete actions. In this context, the origin of standards may have an impact on the way they are designed (orientation, stringency, addressee) and enforced (self-regulation, third party enforcement, hybrid approaches), with public and private standards operating side-by-side sometimes as complementary and sometimes as overlapping instruments (Henson and Humphrey, 2012). Institutional coordination brings together various standard-setters, so the discussion is possible both with regard to the content of specific standards, and with regard to the overall trend towards standardization as a form of governance.

Finally, at the *meta-level*, the focus is upon formulation and application of norms and principles, or rules for making rules, also referred to as constitutional choices. Quality standards appear in their normalizing function as discourses rooted in so-called 'governance images', such as visions, knowledge, judgments, convictions, or metaphors (Kooiman and Jentoft, 2009). At the same time, quality standards have a pronounced future orientation - they are not simply means to goals, but a "moving target", a description of desirable state of affairs. They form a framework that enables public and private actors (second order) to design, coordinate and (successfully) exercise quality in processes (first order), as well as improvise and pivot if the requirements appear out-of-date or yield obsolete. Values, ideas and awareness that standards entail are not tied to concrete situations, but to fundamental social, political, and ethical questions. As a result, both *de jure* and *de facto* unwritten standards that come in form of conventions appear significant at the meta-level. Coordination is

mainly discursive in nature: standards are producing and disseminating knowledge for social learning and diffusion of (self)regulatory practices (Pattberg, 2005).

In sum, standards are related to problem-solving, shared understanding and tacit knowledge in decision situations. This does not mean that standards are the most important element of governance activities at each given level, but that they are the element that the three orders have in common. Any given practical standard applied at the first order of governance is inherently linked to the value-laden images of the meta-level through the plurality of legitimate evaluation criteria institutionalised at the second order. At each order of governance, quality standards have a different function essential to maintenance of the polycentric order.

In what follows, we extend the argument for quality standards as a coordination mechanism in polycentric governance outlined above to the case of shipping. We distinguish between quality shipping as (i) a set of technical and social parameters, (ii) a goal for governance efforts formulated in public and private programs, and (iii) an aspiration for safe, secure, environmentally sound, efficient and sustainable shipping, related to the three orders of governance, respectively. We argue that in addition to performing their functions within each order of governance, quality standards enable coordination between socio-technical innovation (progress in shipping technology and practice), policy and institutional response (rules regulating the adoption and use of socio-technical innovation), and value and knowledge systems (embeddedness of policies and institutions in the dominant social and normative structures). Bringing the three orders of governance into an interaction, quality standards help actors to manage their interdependencies within the maritime value chains by enabling access to and transfer of often tacit information across levels and scales.

4. Environmental quality standards in polycentric shipping governance

Shipping complies with the classical definition of polycentric systems, as it is characterized by multiple governing authorities at different levels, overlapping authority, and an overarching framework of the international legal agreements. The high level of risk associated with maritime causalities, as well as rising awareness of negative environmental and health impacts of shipping has motivated policymakers to tighten environmental and safety regulation of maritime activities. Yet, the hierarchically organized regulatory system based on subordination of levels of authority vested in national jurisdictions has been acknowledged as inappropriate to cope with the reality of shipping as a globalized industry with transboundary adverse effects (Roe, 2012). Scholars have also emphasized

variation in the ability and willingness of actors in charge of enforcing public regulations as a part of shipping environmental governability problem (Alderton and Wichester 2002; Bloor and Sampson 2007; De Sombre, 2007; Corbett et al. 2007). The last two decades witnessed the proliferation of transnational private governance in shipping, including labeling schemes, voluntary certification, and corporate social responsibility, aimed at improving shipping externalities (Wuisan et al., 2012; Yliskylä-Peuralahti and Gritsenko, 2014; Lister et al., 2016; Poulsen et al., 2016; Change and Danao, 2017; Poulsen et al., 2018a, Poulsen et al., 2018b). The question of coordination, or what creates coherence among these multiple arrangements across jurisdictions and different levels of decision-making, remains unaddressed.

While shipping has largely developed in the absence of command-and-control regulation, it has an extensive track record of quality standardization. Standards proliferated after the institutionalization of private shipping governance through classification societies in the early 19th century, a system still in place today (Hormann, 2006; Lagoni, 2007). A unique combination of private governance, customary law and professional values provide a fruitful case for scrutinizing the functioning of quality standards in polycentric shipping governance.

4.1 First order governance: Coordinating socio-technical quality management units

At the first order of governance, quality standards provide technical and operational specifications that guide actions in a direct and applied manner. Technical standards usually apply to vessels and their equipment, crewing, operation and maintenance, non-technical standards address managerial procedures and interactions with customers and broader stakeholders. The content of quality standards in shipping is diverse. Standards help meeting statutory and regulatory requirements with regard to health, safety, security and the environment, as well as ensure that customers' needs from the point of view of quality of services are satisfied. Among the most widely used are ISO 9001 (quality management) and ISO 14000 (environmental management) series (Karahalios, 2015), but there are also more specialized schemes pertaining to a certain aspect, such as voluntary certifications schemes (Wuisan et al., 2012) and environmental CSR commitments (Yliskylä-Peuralahti et al., 2015) addressing pollution from ships.

Since there is usually more than one technical solution available for a problem, different technical fixes may compete with, complement and/or substitute for each other. For example, classification societies Lloyd's Register, RINA, CCS and DNV GL have developed environmental and climate classification rules. According to RINA's rules, a ship can obtain two different Green passports: RINA Green Plus certifies compliance with MARPOL 73/78, whereas RINA Green Star contains

additional measures. LR's ECO notation requires a ship to go beyond MARPOL 73/78 requirements. CCS established three environmental classes: SEEMP I that includes only current MARPOL regulations, SEEMP II that extends to energy efficiency system, and SEEMP III that must have real time monitoring. DNV GL gives CLEAN notation for vessels in compliance with MARPOL 73/78 and CLEAN DESIGN for those complying with additional measures. Thus, besides monitoring mandatory requirements stemming from MARPOL 73/78, 'green notation' developed by classification societies goes beyond mandatory public regulation and can be compared to voluntary measures, such as Clean Shipping Index or environmental CSR.

Operations and best practices vary significantly depending on the sector. For a ship traversing the Northwest Passage, requirements include a ship of a particular design, a set of navigational equipment and specially trained crew familiar with ice navigation, while a tanker operating in the Mediterranean Sea would need a different design and a different set of skills, including navigation in densely navigated waters, to maintain quality operations. As a result, there is a multiplicity of technical and managerial choices – and no one single combination that yields maximum efficiency, safety and environmental protection. In this situation, quality standards have been acknowledged as a key mechanism to find the right combination of technical, operational and managerial choices (Karahalios, 2015). Environmental quality standards allow for coordinating the diversity of socio-technical quality management units, meaning people and technologies they operate, are situation-specific and locally sensitive, yet oriented towards the same result.

4.2 Second order governance: Quality shipping as a policy instrument

At the second order of governance, quality standards allow translating ideas into practice when standardization becomes a new institution crossing the public/private divide. Standardization allows policy coordination between multiple centers of authority and binding together different sources of power (Vogel, 1997). The colossal number of actors involved in shipping governance has often been regarded as a challenge to governability (DeSombre, 2006; Lister et al., 2015). Although nation states in their three legal roles (flag, port, and coastal) remain important in terms of maritime governance, a plethora of actors beyond and beneath the states cannot be ignored as their relative power[2] and their practical engagement into quality shipping is considerable. The principle of "freedom of the seas" that (almost solely) governed shipping for centuries has been supplemented by an inherently contradicting principle of "level-playing-field" (regulated competition) with the establishment of the

[2]Roe (2012) noticed that the influence of major international companies such as Maersk can be compared to influence of nation states (p.129).

International Maritime Organisation (IMO) in 1949 (Gritsenko, 2017). The proliferation of new actors in shipping governance, including NGOs, media, politicians, a wider general public – recently all fueled by social media – has increased the organizational complexity and sharpened the mismatch between the maritime state-centric institutional framework and globalization process in business and society more generally (Roe, 2012). While Lister et al. (2015) emphasized the role of the IMO in orchestrating the plurality of actors, we draw attention to quality standards as an integrative mechanism that makes coordination possible.

The fragmentation of authority and underlying collective action problems are well exemplified in the case of quality assurance in tanker shipping (Håvold, 2010; Hassler, 2011; Gritsenko, 2015). In addition to a multi-level system of global (e.g., IMO rules and MARPOL 73/78 Convention), regional (e.g., Helsinki Convention or US Oil Pollution Act) and local (e.g., port-specific norms, e.g. concerning draught or ice class) regulations for tanker quality standards, there are a number of quality inspections (classification, insurance vetting, port inspection), performed essentially at the same governance level, but by different authorities. Eventually, rules that emerged within the oil industry have an impact on practices within the maritime transport industry and vice versa. Further examples derived from recent studies show that among other actors ports and cargo owners have become more visible in the governance process as they acquired responsibilities as environmental and energy managers and their authority shifted by proliferation of these new activities (Gritsenko and Yliskylä-Peuralahti, 2013; Lai et al., 2013; Acciaro et al., 2014; Wang and Notteboom, 2015). Empirical studies on the role of new actors emphasize that the governance of quality in shipping is not a neatly organized process as the analysis of formal institutional structure may suggest. Rather, standards function as a productive link between the IMO and other shipping regulators, such as classification societies, insurance companies, and industry associations, and actors involved in shipping activities, in particular shippers, ship owners and operators.

Another task that quality standards perform at the second level of governance is coordinating public and private authority to which reduction of air emissions from shipping provides a good illustration (see, e.g., Gritsenko and Yliskylä-Peuralahti, 2013; Acciaro, 2014; Cullinane and Bergqvist, 2014). The IMO introduced additions to MARPOL Annex VI in 2006, and as a consequence several areas of the world ocean were designated as emission control areas (ECAs) with special emission caps as well as offered the concepts for energy efficient design. While these rules are mandatory, this is not the case for all seas and all ships. At the same time, the environmental notation explained in Section 4.1 has been introduced by the leading certification societies, while private certification schemes unrolled their own rules for auditing ships that reduced their air emissions. While these are optional,

they can be seen as supportive of the IMO's regulatory effort, giving it a world-wide reach softened by voluntary adoption.

4.3 Third order governance: Quality standards as a convention

At the third order of governance, quality standards function as 'images' of governance which are neither tangible (material) nor fixed. Quality shipping can be conceptualized as an idea (Shinohara, 2005), perception (Wankhade and Dabade, 2010), or convention (Ponte and Gibbon, 2005), shaped by multiple actors, including ship owners, classification societies, port authorities, cargo owners, charterers, insurers, and seafarers effectively operating the vessels, as well as bureaucrats, politicians, interest groups and environmental advocacies. All of them have their own ideas of how safety and environmental issues in global shipping are to be addressed (Haralambides, 1998). The pursuit of quality in shipping depends on the ability of all these actors to develop a common language. Standardization through concepts opens up strategies for broader stakeholders – including scientists and non-governmental organizations – to engage into a conversation on what quality shipping should be (Demortain, 2008). Even the ISO concerned with development of operational standards underlines the importance of standardization as a vehicle to develop terminology that provides a basis for effective coordination between different agencies and cultures who need to work together, for example, in situations of emergency response to maritime pollution (ISO, 2000).

Since all seafarers are concerned with their own safety (Vandeskog, 2015) and shipping companies, national regulators, unions and larger shippers realise that safety is a cornerstone of industry's sustainability, "safety culture" is among the dominant discourses in shipping. Research has attempted to analyze how the general rules codified in laws and formal structures transform into operational instructions by introducing a category of "risk perception" (see e.g., Bailey, 2006; Bhattacharya, 2012; Kristiansen, 2013). The thesis about the "human element" as a core cause of most maritime accidents has been widely advocated (Rothblum, 2000; Hetherington, Flin and Mearns, 2006; Celik and Cebi, 2009). The recent literature has also stressed that the cultural aspect (in particular, seafarer training, work culture and risk perceptions) is potentially the biggest challenge in achieving comprehensive quality shipping (Shinohara, 2005; Zhao and Amante, 2005; Håvold, 2007; Theotokas and Progoulaki, 2007).

At the same time, greater formalization of safety management in shipping has been shown to lead to negative sentiments among the seafarers (Vandeskog, 2015) and marginalization of local and system-specific safety knowledge (Almklov et al., 2014). At the same time, the Rule of Good Seamanship, a

unique convention central to navigation practice, retains its importance for seafarers as a description of desirable behavior (Knudsen, 2009; Manuel, 2011). It truly shall be followed 'in the spirit rather than in the letter', since it has never been codified, but belongs to the customary maritime law and implies styles of action that have been rewarded historically. Nevertheless, Good Seamanship has been invoked in court cases at the maritime tribunal (McKinnon, 2009; Fujiwara et al., 2017). The Rule allows a departure from the codified rules of navigation if that is necessary to avoid collision or any other immediate danger. It does not enlist the qualities of a 'good seaman', but recognizes technical competence, efficiency, and due diligence as embedded in both historical and contemporary context. Good Seamanship is a strong indication of a quality standard pertaining to safety that is a norm with outstanding discursive power.

Challenges at the third order of governance are also manifested through multiple mindsets represented in global shipping. For instance, growth and efficiency as socio-economic values pertain to the free-market (shareholder) capitalism mindset, whereas safety, environmental care and corporate responsibility are attuned to a normative stakeholder approach. Quality shipping standards inevitably function within these underlying tensions and arguably hold potential to softening them. An illustration can be derived from adoption of quality as a corporate strategy in the framework of a triple-bottom-line approach to value creation (Lai et al., 2011). Studies of corporate social responsibility (CSR) practices in the shipping sector discovered differences between container shipping that had been an earlier adopter of CSR and other maritime logistic sectors (Pawlik et al., 2012; Paulsen et al., 2016). These differences are attributed to the structure of inter-organizational relations and container segment market orientation to final consumers (business-to-consumers, or B2C) rather than other firms (business-to-business, or B2B). In container shipping more developed CSR practices were associated with B2C linkages realized through a shipping lines' function of connecting global brands and their consumers, thus emphasizing the diversity in demand for quality shipping (Skovgaard, 2018). Yet, following the lead of container shipping, tanker and Ro-Ro sectors started engaging into CSR. Such examples of transfer of practices related to quality standardization from one domain of operations to another highlight the role of quality standards as governance images.

4.4 Coordination through quality standards in shipping

We argue that quality standards can be essential to polycentric governance as they function at three orders of governance and bring them into an interaction. A process of organization of different shipping actors and activities enabling them to manage interdependencies revolves around quality standards because they allow for (1) multiplicity of standard setting authority, (2) redundancy in

standard-setting and enforcement, and (3) negotiation amongst standard users and between standard setters and users. The existence of autonomous decision-makers pursuing their quality goals independently of each other draws upon the overarching legal framework provided by the international maritime law that is maintained though the International Maritime Organisation (IMO) that plays an important orchestrating role. These features distinctive of polycentric governance systems need to be upheld to create a system of internal references that facilitates conflict resolution without any central organizationally-driven mechanism.

First, quality standards have proven to be effective in enhancing regulatory competition by introducing new sources of authority (Reinecker et al., 2012). The legitimacy of standards is rooted in the expertise of the standard-setter and not in formal authority, thus (at least in theory) any actor that can convince others in the usefulness of their standard can become a *de facto* regulator. Furger (1997) suggests there are examples in the maritime sector of what he terms "accountability" and self-governance standards which with time transferred from voluntary to mandatory measures. For instance, trade associations, such as Chambers of Shipping, Port Associations, the American Petroleum Institute, and the American Institute of Shipping established voluntary codes of practice, which further influenced the international maritime conventions adopted by the International Maritime Organisation (IMO). Integrative functioning of quality standards implies crossing the boundaries between public and private authority, creating hybrid for a needed to keep up with technological (e.g., automatic identification system) and professional (e.g., watchkeeping practices) development and update quality standards accordingly.

Secondly, standards provide redundancy as they enable multiple enforcement mechanisms. Scholars have found that quality standards do not converge, so that several competing arrangements function simultaneously (Fransen, 2011). On the one hand, the idea of overlapping standards as a productive feature in transnational governance is counter-intuitive – standards are a tool for unification of practices and norms, also called standardization. On the other hand, such a 'standards market' (Reinecke et al., 2012) has various positive effects, including regulatory competition (whose standard is most comprehensive), social learning (what constitutes a comprehensive standard), and development of a common vocabulary. Through de-coupling of standard-setting and enforcement, multiple standards can be monitored by the same authority, and multiple authorities (certifiers) can monitor the same standard, which leads to competition between the certifiers, too. In shipping, such de-coupling is used in classification, a system of verifying that a ship complies with certain standards. Classification societies, whose goal is to ensure compliance with class rules, currently occupy a unique position as non-governmental standard-setting bodies as regards design, construction and

maintenance of vessels. Different classification societies have different standards, which enhances regulatory competition (the first mechanism). The major international maritime conventions (Load Line Convention, SOLAS, ISM Code) hold that a ship built according to the rules of a recognized classification society has sufficient strength of the hull, reliable machinery and vital systems, thus these conventions do not have such provisions. As a result, core part of safety and recently environmental standard setting and surveillance is delegated to these independent non-governmental organizations. Yet, when it comes to audit, another institution – port State control – conducts inspections to verify compliance with mandatory public regulations and classification standards.

Finally, quality standards are negotiated both within and between the levels of governance. Normalizing function of quality standards involves a process of negotiation of an agreement on what is quality, that is criteria of which features and processes are considered qualified, enabled through a shared vocabulary. Hence, standards can facilitate knowledge production and sharing within networks and on a peer-to-peer basis, increase interdependency between actors through overlapping membership in standardization schemes, and create nested relationships through third party audit (Eberlein et al., 2014). In addition to these direct forms of coordination, quality standards can perform the functions of informal norms described by Tarko (2014) as they provide a common cognitive framing of problems and goals (Ponte and Gibbon, 2005). These common framings inform practices and procedures which create objective references for the process of quality management within the first governance order. Environmental quality standards help actors learn from more than one jurisdiction at a time, take away a multiplicity of lessons, and adapt new policies in a flexible way (Stone, 2007). By negotiating standards, actors are not only learning about the best practices for instance, in ballast water treatment technology, but also the ideas and informal practices of ballast water management across different flag administrations and industry pioneers (Rak et al., 2018). The three mechanisms – regulatory competition, enforcement redundancy, and (re-)negotiation – place standards into a position of coordinating across jurisdictions and different levels of decision-making in deterritorialized shipping industry.

5. Discussion and conclusion

In this paper, we have argued that quality standards, broadly defined as quality requirements applied to products and processes, represent a mechanism that facilitates coordination between geographically and organizationally diverse economic actors in domains characterized by multiple intra-sectoral linkages. While scholars of transnational business governance and global value chains paid attention to quality standards, they did not systematize the functioning of quality standards across

the ‘horizontal’ and ‘vertical’ dimensions of transnational governance systems. In this paper, we invoked the notion of polycentric governance as a framework incorporating both horizontal and vertical dimensions to bring together insights from various strands of theorizing on quality standards. We argued that three functions – regulative, integrative and normalizing – associated with quality standards are crucial to understand coordination in polycentric shipping governance.

The functioning of quality standards can be analysed along three governance orders, each corresponding to a distinct functional dimension. First, quality standards developed and implemented to enhance quality management of certain socio-technical units are tangible action guidelines at the first level of governance where operational choices are made. The analysis has shown that even standards that are not followed by everyone provide practical examples of how quality management could be organized, hence raising awareness in shipping sub-sectors. The second dimension in which quality standards are paramount is institutionalized policy-making. The capacity of quality standards to cut across public/private divide and integrate fragmented authority is crucial to coordination at the second order of governance. Finally, development of a common understanding and learning have been presented as the third possible function of quality standards. The analysis suggests that shaping of a common vocabulary with regard to quality shipping is an ongoing learning processes that materializes not only within standard-setting organizations, but among broader stakeholders and on board ships. These three interrelated functions contribute to the emergence of coordination mechanisms that maintain the specific setup of polycentric governance. Regulatory competition, redundant enforcement, and mutual adjustment through negotiation place quality standards, rather than any specific organization, into the center of coordination process.

From a more practical point of view, our analysis calls for re-assessment of the role quality standards play in transnational environmental governance of shipping, setting limitations to what standards can actually deliver. Counter to the arguments favoring the regulatory use of standards, we recognize the inherent limitations of standards as voluntary requirements, and argue that the main value of quality standards is informative, integrative, and discursive. Quality standards are required practices, rather than a description of what is actually practiced, but these requirements, unlike those postulated in the international legal agreements, reflect collective intentions in the value chains (or their parts). Quality standards have substance that is neither abstract nor subjective due to the constant ongoing negotiation across levels and scales of governance. The ideational underpinnings of coordination in polycentric governance previously demonstrated in research on science not only apply to transnational environmental governance of shipping, but open up space for action. Engaging wider

stakeholders into ideation around quality standards has a potential to enhance the alignment with goals of individual ship-owners and operators.

The conceptual model developed here has a structural element that allows capturing the relationships between the orders of governance and processual elements that highlight 'horizontal' effects of quality standardization within each order. Yet, this is only a first step towards a systematic analysis of coordination in polycentric non-resource governance. Future research is therefore needed, tackling different cases and engaging in comparative studies of framing, storing, and sharing visions of desired outcomes in the process of standardization. From our point of view, questions could also focus on how standards change and which effect their evolvement has on coordination in polycentric governance systems.

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Table 1: Typologies of standards.

Brunsson et al., 2012	content	*Product standards*	Establish characteristics of a product, thereby allowing us to differentiate, for instance, organic from conventional agricultural produce
		Process standards	Regulate process within and between organization, and they may or may not link the process to the outcomes
Gilbert et al. 2011	content	P*rinciple-based standards*	General frameworks for values and behavior without specifying concrete measurable targets
		certification standards	Involve certification, verification and monitoring of production facilities against predefined criteria
		reporting standards	Define indicators and guidelines that can be used to produce standardized – and thus comparable – reporting on specific issues

		process standards	Focus on the question of *how* a product or service is produced or delivered.
Brunsson et al., 2012, Reinicke et al., 2012	orientation	*Technical standards*	Requirements applied to technical systems, that, among other things, specify components and their relations in a certain appliance, define a measurement or planning procedure, ensure compatibility of different notation systems.
		non-technical standards	Socially-oriented *non-technical standards*, such as standards for ethics, fairness or corporate responsibility, have an important political and normative dimension in a sense that their existence may be justified in terms of public policy objectives.
Kerwer, 2005	addressee	*Common use standards*	Such as shoe sizes, are made on a "to whom it may concern" basis, meaning that they are for common use and any party that perceives a standard to be useful can adopt it.
		Club standards	Developed within organizations, for instance, industry associations, for their own use and are compulsory for the club members, i.a. define the club membership.
		Public standards	Designed for public sector and usually appear in a form of 'best practice', such as good governance standards promulgated by the World Bank
Henson and Humprey, 2012	scope	*Public mandatory standards*	Essentially regulation
		public voluntary standards	Created by public bodies but are not obligatory
		private voluntary standards	Created and adopted by private bodies
		private mandatory standards	Developed by the private bodies, but later legally mandated by the government
Brunsson et al. 2012	standard-setting and their adoption	*de jure*	Outcome of a deliberate decision-making process, for instance, through the work of the International Standardization Organization (ISO) or an industry group

		de facto	Emerge gradually from a non-regulated process of convergence towards the same practice (they use the QWERTY typewriter layout as an example)
Hatto, 2001	standard-setting body	*formal standards*	Developed by a specialized national (e.g., British Standard), regional, or international body (ISO)
		informal standards	Developed by associations (e.g., IEEE - Institute of Electrical and Electronic Engineers, SAE Society of Automotive Engineers), industry groups, NGOs and the like
Kerwer, 2005, Demortain, 2008.	standardizing arenas	*Private standardization*	Independently produced by a private actor is absorbed by the other private actors, with no cooperation between standard setters and users.
		Committee standardization	Set by transnational government networks aiming at "coordinating international standard setting and (predominantly national public) enforcement" (p. 625).
		Standardization networks	Joint effort between public and private actors under the supervision of transnational committees that take into account standard setting and enforcement.
		standardization within organizations	Led by states, members negotiate standards in an international forum and implements them at the national level.
		standardization by scientists	Forum to produce concepts that include both formal standards setters and potential users

Authors based on Brunsson et al., 2012, Demortain, 2008, Gilbert et al. 2011, Hatto, 2001, Henson and Humprey, 2012, Kerwer, 2005, Reinicke et al., 2012.

Table 2: Basic features of polycentricity: a comparative overview.

Vincent Ostrom (Ostrom et al)	**Bloomington School (McGinnis and Elinor Ostrom)**	**Aligica and Tarko**

(1) many autonomous units formally independent of one another, (2) choosing to act in ways that take account of others (3) interacting through process of cooperation, competition, conflict, and conflict resolution.	(1) freedom to enter/exit; (2) legitimate exercise of coercive capabilities; (3) overarching system of rules; (4)existence of constitutional rules (rules on how to change rules); (5) incentives alignment.	(1) multiplicity of decision centers ("active exercise of different opinions"); (2) institutional and cultural framework that provides the overarching system of rules defining the polycentric system; (3) spontaneous order generated by evolutionary competition between the different decision centers' ideas, methods, ways of doing things.

Authors based on V. Ostrom (1991), McGinnis and Ostrom (2012), Aligica and Tarko (2012).

Table 3: Quality standards in polycentric governance.

Governance order	**IAD choice type**	**Standards as …**	**Function**
first	operational	action guidelines, practical rules	material/regulative
second	policy	collective intentions	institutional/integrative
third (meta)	constitutional	image, value, aspiration	cognitive/discursive

Authors based on Kooiman and Jentoft (2009), Ostrom (2005), Pattberg (2005).